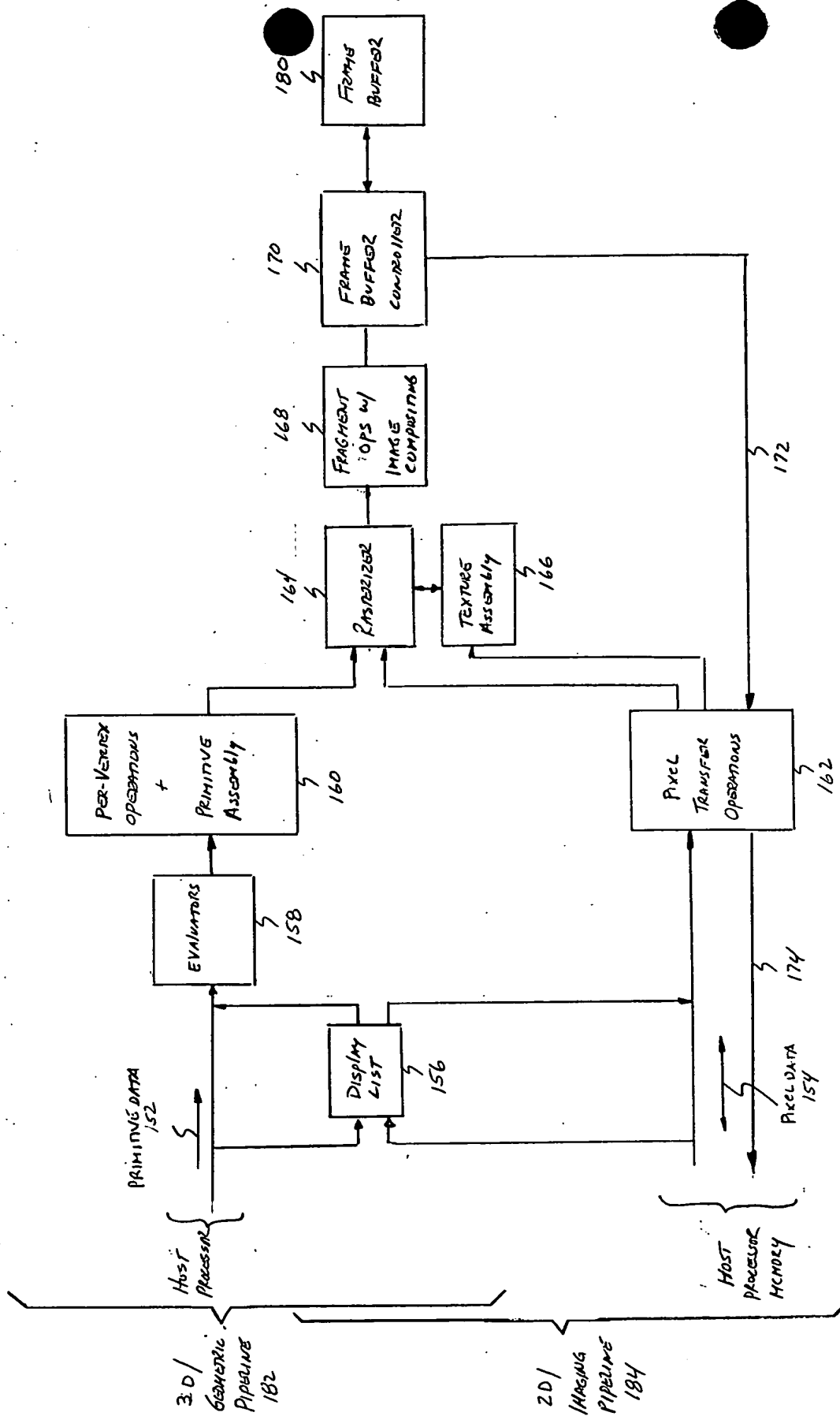Computer Graphics Environment 100
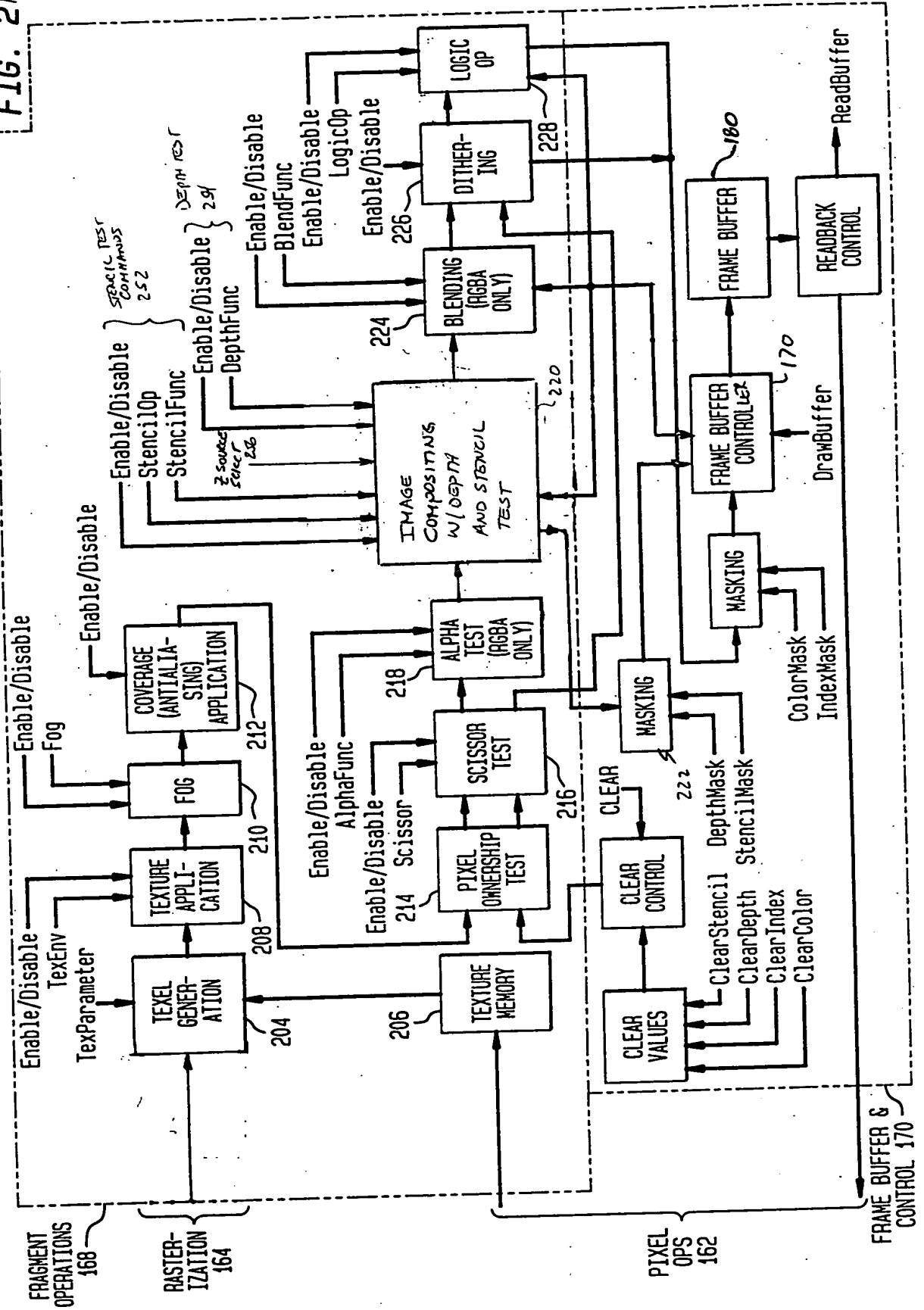
FIGURE 1A
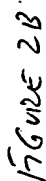
Figure 1B

Rendering Pipeline 150

FIG. 2A

FRAME BUFFER
180

PIXEL
ADDRESS
(X,Y)

| RGB Color Buffer 262 | Z Depth Buffer 264 | Stencil Buffer 266 | Other 268 |

FIGURE 2B

220

STENCIL TEST
COMMANDS
252

MASKING 282

BLENDING 224

STENCIL OP 338

STENCIL FUNC 340

ENABLE/DISABLE 336

DEPTH TEST COMMANDS
254

Z DATA 326

STENCIL DATA 328

ADDRESS 316

ENABLE/DISABLE 322

DEPTH FUNC 334

STENCIL
TEST
MODULE

304

324
Z PASS
FLAG

324
Z (DATA)

STORED
STENCIL
320

DEPTH
TEST
MODULE

302

STAGING
FIFO

306

RGBA
XY

STAGING FIFO

308

Z NEXT
322

MUX

310

Z SOURCE
SELECT
256

DEPTH DATA
CHANNEL 312

COLOR DATA
CHANNEL 314

ADDRESS DATA
CHANNEL 316

Z STORED 318

STORED STENCIL 320

RGBA 314

ALPHA
TEST
218

FRAME
BUFFER
CONTROLLER
170

FIGURE 3

STORE A FIRST 3D IMAGE IN FRAME BUFFER — 402

PROCESS Z COORDINATE DATA FOR NEXT IMAGE THROUGH IMAGING PIPELINE, STORING RESULTS OF DEPTH TEST — 404

PROCESS COLOR DATA FOR NEXT IMAGE THROUGH IMAGING PIPELINE BASED ON STORED DEPTH TEST RESULTS — 406
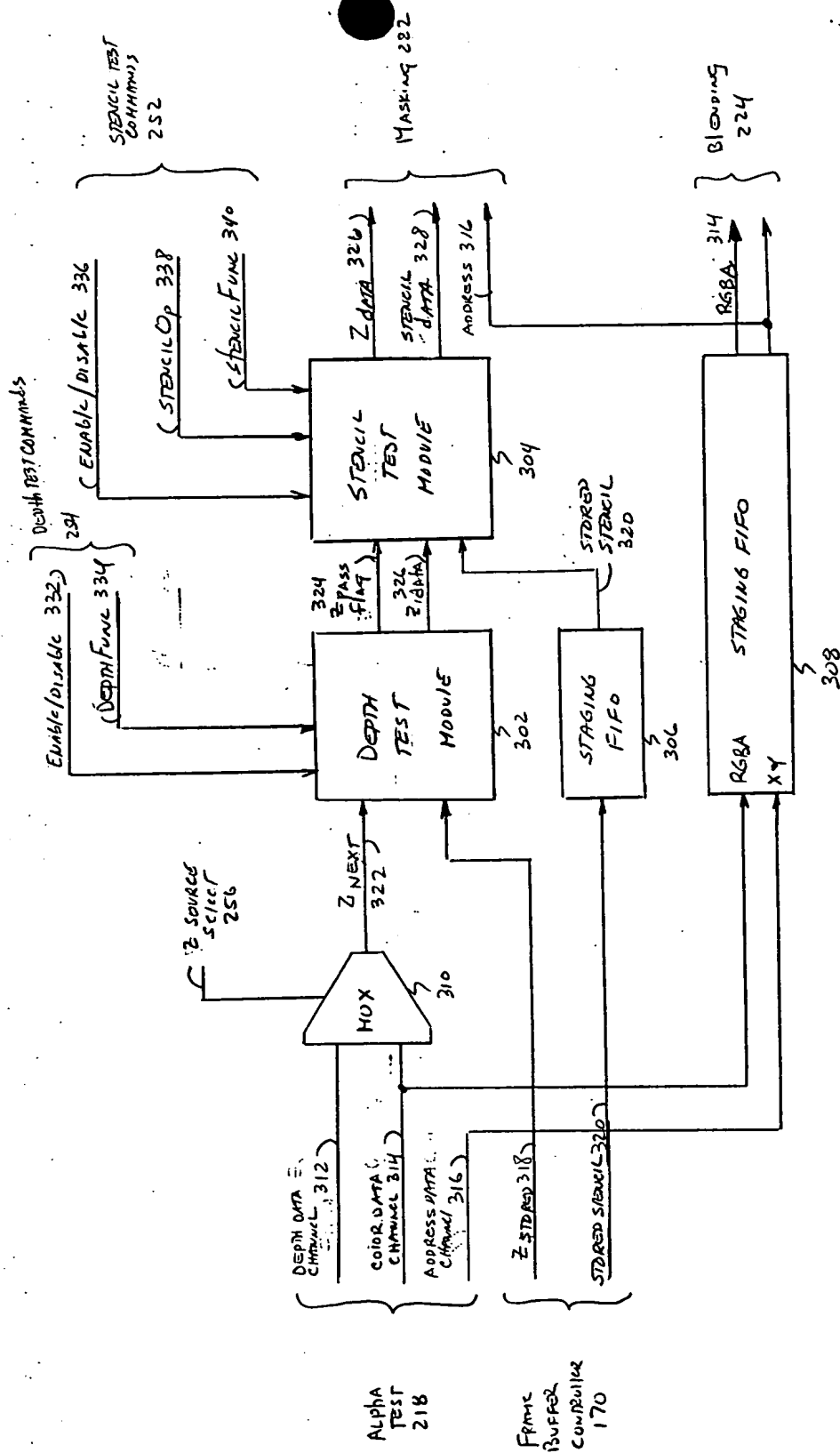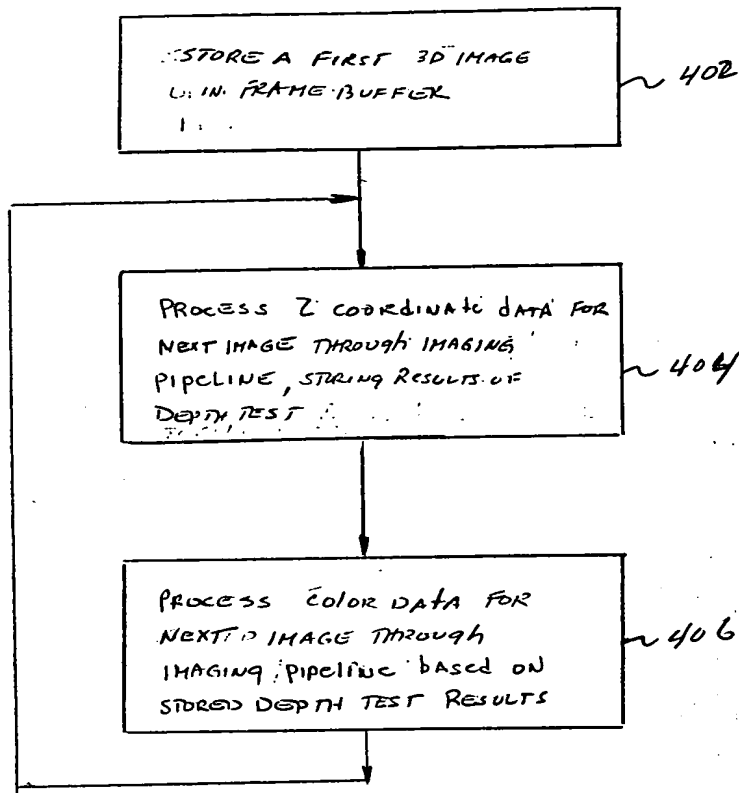
FIGURE 4

SELECT COLOR DATA
CHANNEL AS INPUT TO
DEPTH TEST MODULE — 502

PROCESS Z COORDINATE DATA OF
NEXT IMAGE THROUGH COLOR
DATA CHANNEL OF IMAGING PIPELINE — 504

PREVENT UPDATES OF COLOR
BUFFER — 506

PERFORM DEPTH TEST — 508

PERFORM STENCIL TEST TO STORE
PREDETERMINED VALUE IN STENCIL
BUFFER WHEN DEPTH TEST
PASSED — 510

FIGURE 5A

CLEAR STENCIL BUFFER — 550

ENABLE DEPTH TEST — 552

SET DEPTH TEST FUNCTION — 554

ENABLE STENCIL TEST — 556

SET STENCIL FUNCTION TO
ALWAYS PASS AND MODIFY
BUFFER WHEN DEPTH TEST PASSES — 558

MASK COLOR BUFFER WRITES — 560

SELECT COLOR DATA CHANNEL
AS INPUT TO DEPTH TEST MODULE — 562

TRANSFER Z coordinate data
FOR NEXT IMAGE THROUGH
COLOR DATA CHANNEL OF
IMAGING PIPELINE — 564
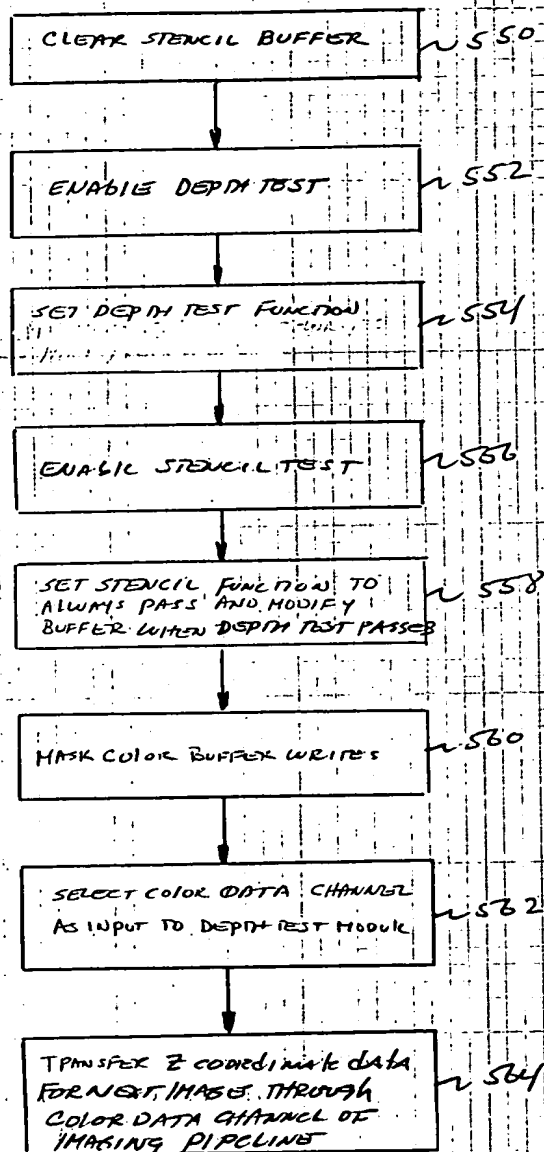
FIGURE 5B

```
┌─────────────────────────────────┐
│  SELECT DEPTH DATA CHANNEL       │
│    AS INPUT TO DEPTH TEST        │~ 602
│    MODULE                        │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  TRANSFER IMAGE COLOR DATA       │
│  THROUGH IMAGE PIPELINE OVER     │~ 604
│  COLOR DATA CHANNEL              │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   DISABLE DEPTH TEST             │~ 606
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  PERFORM STENCIL TEST TO PASS    │
│  WHENEVER STENCIL BUFFER INDICATES│~ 608
│  DEPTH TEST PASSED               │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   UPDATE COLOR BUFFER WITH       │~ 610
│   COLOR DATA                     │
└─────────────────────────────────┘
                 │
                 ▼
```

FIGURE 6A

```
┌─────────────────────────────────────┐
│  DISABLE DEPTH TEST FUNCTION        │─── 650
└─────────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────────┐
│  ENABLE  WRITING  TO  COLOR         │─── 652
│  BUFFER                             │
└─────────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────────┐
│  ENABLE  STENCIL  TEST              │─── 654
└─────────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────────┐
│  SELECT STENCIL TEST FUNCTION       │─── 656
│  TO PASS WHEN Z TEST PASSED         │
└─────────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────────┐
│  SELECT DEPTH DATA CHANNEL AS       │─── 658
│  INPUT TO DEPTH TEST MODULE         │
└─────────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────────┐
│  TRANSFER IMAGE COLOR DATA          │─── 660
│  THROUGH IMAGE PIPELINE OVER        │
│  COLOR DATA CHANNEL                 │
└─────────────────────────────────────┘
```

FIGURE 6B